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Eryngiofaga perrara sp. nov. (Hemiptera, Psylloidea) from Mount Pilatus (Obwalden), a new species of a genus previously unknown from Switzerland or the Alps

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Abstract

Eryngiofaga perrara **sp. nov.** is described, diagnosed and illustrated from two adult specimens found on Mount Pilatus (Switzerland, Obwalden). The new species is morphologically most similar to *E. matura* (Loginova, 1972), a species from Mongolia, from which it differs in the light genal processes and in details of the terminalia. *Eryngiofaga* consists of 13 previously described species of which five occur in Central and Western Europe. Up to now, the genus was not known from Switzerland or the Alps. The host plant of *E. perrara* remains unknown, but *Bupleurum ranunculoides* L. (Apiaceae) is a likely candidate.

Key Words

Sternorrhyncha, Triozidae, systematics, phytophagy, Central Switzerland, Prealps

Introduction

Jumping plant lice or psyllids constitute a superfamily of Sternorrhyncha with slightly over 4000 described species worldwide. As immatures, most species are mono- or oligophagous, i.e. they develop only on one or several phylogenetically close plant species. Often related psyllid species develop on related host taxa and many genera are restricted to a single plant genus or family (Burckhardt et al. 2014, 2021; Ouvrard et al. 2015). A genus illustrating this pattern is *Eryngiofaga* Klimaszewski, 1968 (Triozidae) with 13 described species associated with *Bupleurum* and *Eryngium* (Apiaceae) (Ouvrard 2022). Several species have been misidentified in the older literature, but Loginova (1977) revised the genus and provided an identification key diagnosing most of the constituent species. For the lack of material, *E. mesomela* (Flor, 1861), *E. loewiana* (Šulc, 1913) and *E. expectata* Klimaszewski, 1971 were not treated. The last species is only known from one female. Most species occur in temperate Asia and Eastern Europe, but five species are also found in Central and Western Europe. The genus has not yet been reported from Switzerland or the Alps.

Studies on the psyllid fauna of the Central Swiss Prealps in the last 45 years showed an unexpected psyllid diversity (Burckhardt 1983, 1994), including four species that were, at the time, new to science (Burckhardt et al. 1991; Burckhardt and Lauterer 2002a, b). Pilatus, which rises from Lake Lucerne at about 430 m a.s.l. to just over 2100 m a.s.l., is one of the mountains that has been regularly visited. An alpine meadow with rocks called "Chilchsteine" is located on the southern slope between 1850 and 1900 m a.s.l. About a dozen psyllid species were found at this site, of which *Aphalara longicaudata* Wagner & Franz, 1961 on *Polygonum bistorta* and *Bactericera femoralis* (Foerster, 1848) on *Alchemilla* spp. were by far the most common species. In 2000, a single female of an unknown species was discovered. Despite intensive search, no additional specimens turned up until in 2010, at the same place, one male was discovered. The two specimens turned out to be a new species of the genus *Eryngiofaga*. Here the new species is described and its relationships to other congeners are discussed.

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Material and methods

For the identification of the specimens, following species from the psyllid collections of the Muséum d'histoire naturelle, Genève, Switzerland (**MHNG**) and the Naturhistorisches Museum, Basel, Switzerland (**NHMB**) were examined: *Eryngiofaga deserta* Loginova, 1977, *E. hungarica* (Klimaszewski, 1968), *E. lautereri* Loginova, 1977, *E. matura* (Loginova, 1972) and *E. mesomela*. In addition, the key of Loginova (1977) was used. The holotype and paratype of the new species are deposited in NHMB. The morphological terminology follows Halbert and Burckhardt (2020). Measurements were taken as follows: adult body length from dry mounted specimens, measuring the distance between the fore margin of the head and the tip of the forewings when folded over the body; the measurements of the terminalia were taken from temporary mounts on a slide in glycerine, the other structures from dry mounted specimens. The measurements and ratios are given as range. The classification and nomenclature of Psylloidea follow Burckhardt et al. (2021) and Ouvrard (2022).

Results

Taxonomy

***Eryngiofaga* Klimaszewski**

Remarks. *Eryngiofaga* is a palaearctic genus comprising 13 described species (Loginova 1977). Based on the paramere shape, two species groups can be recognised. The *mesomela* group, with digitiform parameres bearing a small basal sclerotised process on the inner face, includes *E. babugani* (Loginova, 1964), *E. deserta*, *E. dlabolai* (Vondráček, 1957), *E. lautereri*, *E. loewiana* and *E. mesomela*. The *congenita* group, with lamellar or triangular parameres bearing a large sclerotised process usually arising on the inner face from the middle, is composed of *E. armeniaca* (Gegechkori, 1974), *E. congenita* (Loginova, 1966), *E. hungarica*, *E. maga* (Loginova, 1966), *E. matura* and *E. refuga* (Loginova, 1966). An additional species, *E. expectata*, is known from a single female only.

***Eryngiofaga perrara* sp. nov.**

https://zoobank.org/153CB420-A251-4F01-A70D-6B9787EF2520

Figs 1–8

Type locality. Switzerland, Obwalden, Pilatus, Chilchsteine, 46.9758°N, 8.2542°E, 1850 m.

Holotype. Male. SWITZERLAND: Obwalden, Pilatus, Chilchsteine, 46.9758°N, 8.2542°E, 1850 m, 12.vii.2010, D. Burckhardt & I. Zürcher // herbaceous vegetation with *Alchemilla*, *Astrantia*, *Bupleurum*, *Cerastium* // *Eryngiofaga perrara* sp. nov., holotype, det. D. Burckhardt, 2022 // NMB-PSYLL0007231 // NHMB, dry.

Paratype. SWITZERLAND, 1 female, Obwalden, same data as holotype but 18.vii.2000, D. Burckhardt // herbaceous vegetation // PSYLL NHMB 00002446 // NHMB, dry.

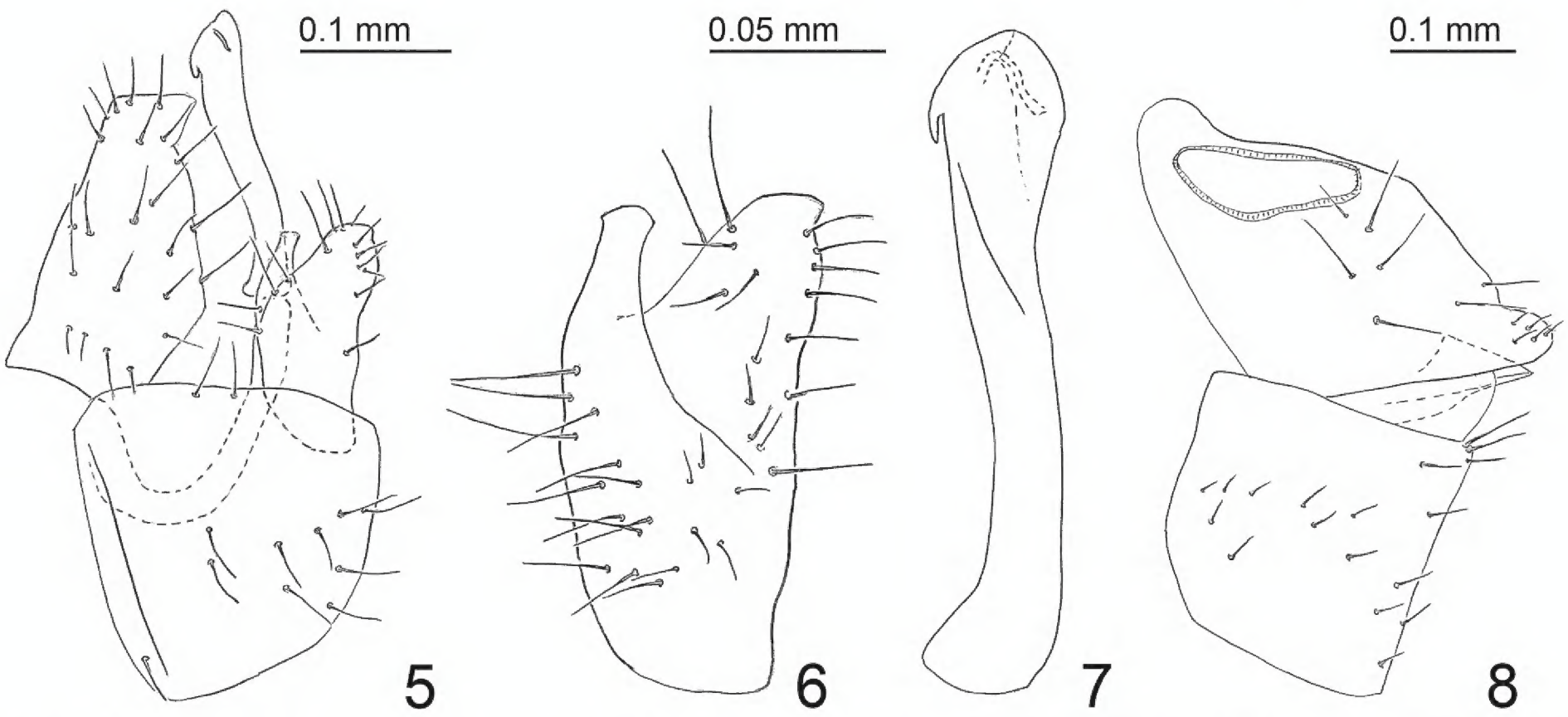
Diagnosis. Adult yellow to orange (Figs 1–3); genal processes light apically (Fig. 4); with more or less dis-

Figures 1–4. *Eryngiofaga perrara* sp. nov. **1–3.** Habitus, adults; **1.** Male, in lateral view; **2.** Male, in dorsal view; **3.** Female in lateral view; **4.** Head, in dorsal view. Scale bars: 0.5 mm (**1–3**); 0.2 mm (**4**).

tinct greyish brown longitudinal medial stripe on head and thorax. Antennal segments 1–3 yellow, segments 4–10 almost black. Forewing transparent, colourless. – Genal processes conical, subacute apically, 0.3–0.4 times as long as vertex along midline. Antenna 1.9–2.2 times as long as head width. Forewing (Figs 1, 3) 4.3–4.4 times as long as head width, 2.8 times as long as wide; costal margin strongly, evenly curved, anal margin almost straight; vein Rs short, distinctly concave; surface spinules lacking apart from base of wing. Paramere bifid (Figs 5, 6); with narrow inner anterior process which is sclerotised apically bearing each a small anterior and posterior toothlet, and with broader outer posterior lobe which is irregularly narrowing to strongly sclerotised apex forming apical tooth. Distal segment of aedeagus (Fig. 7), hardly expanded basally, weakly expanded apically with small subapical hook ventrally. Female terminalia (Fig. 8) short; proctiger ending in small apical tubercle.

Description. Adult (Figs 1–8). Colouration. Yellow to orange (Figs 1, 3). Head and thorax with a greyish brown longitudinal medial stripe, very light in male (Fig. 2), darker in female. Tips of genal processes light (Fig. 4). Eyes red to greyish. Antennal segments 1–3 yellow, segments 4–10 almost black (Figs 1–3). Legs yellow with apical tarsal segments dark brown; pro- and mesofemora dark brown laterally; pro- and mesotibiae yellow in basal quarter, greyish brown otherwise; basal segment of pro- and mesotarsi greyish brown. Forewing (Figs 1, 3) transparent, colourless with yellow to light brown veins. Hindwing whitish, transparent. Abdominal tergites in male ochreous, in female brown. Male with slightly less expanded and distinct dark colour.

Structure. Conforming to the generic description of Loginova (1977). Body length ♂ 2.5 mm, ♀ 2.7 mm (1 ♂, 1 ♀). Head hardly inclined from longitudinal body axis (Figs 1, 3). Vertex subtrapezoidal (Fig. 4). Genal processes conical, subacute apically, 0.3–0.4 times as long as vertex along midline (Fig. 4). Antenna 1.9–2.2 times as long as head width; relative length of flagellar segments as 1.0 : 0.3 : 0.3 : 0.3 : 0.3 : 0.2 : 0.2 : 0.2; segment 3 longer than segments 4–6 together; relative length of segment 10 and terminal setae as 1.0 : 0.7 : 0.4. Rostrum short, only tip of apical segment visible in lateral view. Metatibia 0.9–1.2 times as long as head width. Forewing (Figs 1, 3) 4.3–4.4 times as long as head width, 2.8 times as long as wide; costal margin strongly, evenly curved, anal margin almost straight; wing widest near the middle; subacute apically, wing apex lying in cell r_2; vein Rs short, distinctly concave; m_1 cell value 1.2–1.5, cell cu_1 value 1.7–1.9; surface spinules lacking apart from base of wing; radular spinules present in cells m_1, m_2 and cu_1. Hindwing two thirds length of forewing, membranous; costal setae not grouped. Terminalia as in Figs 5–8. Male proctiger (Fig. 5) 0.5 times as long as head width, sparsely beset with long setae, weakly produced posteriorly; posterior margin slightly angular in basal third. Paramere (Figs 5, 6) bifid; in lateral view, with narrow inner anterior process which is sclerotised apically, bearing each a small anterior and posterior toothlet, and with broader outer posterior lobe which is irregularly narrowing to strongly sclerotised apex forming an apical tooth; the outer face bears long setae mostly on the outer posterior lobe; the inner face with long setae along the anterior margin in basal half and on the outer posterior lobe in apical two thirds. Distal segment of aedeagus (Fig. 7) hardly expanded basally, weakly expanded apically, bearing small subapical hook ventrally; sclerotised end tube of ductus ejaculatorius moderately long, weakly sinuous. Female terminalia (Fig. 8) short; proctiger 0.8 times as long as head width, sparsely beset with long setae in the middle and short setae apically; dorsal outline, in lateral view, strongly narrowing towards apex which forms a small tubercle; circumanal ring oval, 0.6 times as long as proctiger, consisting of two unequal rows of pores.



Figures 5–8. *Eryngiofaga perrara* sp. nov., terminalia. **5.** Male terminalia, in lateral view; **6.** Inner face of paramere; **7.** Distal portion of aedeagus; **8.** Female terminalia, in profile. Scale bars: 0.1 mm (**5, 8**); 0.05 mm (**6, 7**).

Female subgenital plate 0.6 times as long as proctiger, acute apically; sparsely beset with moderately long setae laterally. Dorsal valvulae, in lateral view, triangular; ventral valvulae straight, lacking teeth.

Measurements (in mm; 1 ♂, 1 ♀). Head width 0.46–0.50; antenna length 0.96–1.00; forewing length 1.98–2.20; male proctiger length 0.24; paramere length 0.16; length of distal segment of aedeagus 0.22; female proctiger length 0.40.

Immature unknown.

Etymology. From Latin perrarus = very rare, in reference to the paucity of available material.

Distribution. Known only from Mount Pilatus (Switzerland, Obwalden).

Host plant unknown. As host plants of *Eryngiofaga* species are restricted to the genera *Bupleurum* and *Eryngium* (Apiaceae) a likely host of *E. perrara* is *Bupleurum ranunculoides* L. which grows at the site "Chilchsteine" on Mount Pilatus.

Comments. The morphology of the parameres places *E. perrara* in the *congenita* group. It differs from *E. armeniaca* and *E. maga* in the basally more slender distal segment of the aedeagus, and from *E. congenita*, *E. refuga*, *E. hungarica* and *E. matura* in the much shorter subapical ventral hook on the distal segment of the aedeagus. It differs also from the other species of the *congenita* group in details of the paramere. In *E. hungarica* the anterior process of the paramere is broad (slender in all the other species); in *E. congenita*, *E. maga* and *E. matura* the posterior lobe of the paramere, in lateral view, is narrowly triangular and distinctly longer than the anterior one (broadly triangular and only slightly longer in the other species); in *E. armeniaca* the posterior lobe is big and the incision between anterior and posterior lobes is shallow not reaching the apical quarter of paramere (posterior lobe narrower and incision deep reaching basal third in *E. perrara*); in *E. refuga* the anterior process of the paramere is strongly curved along fore margin terminating in a posteriorly directed tooth (anterior process weakly curved anteriorly and terminating in each a forward and backward directed toothlet in *E. perrara*). The head, thorax and abdomen of *E. congenita*, *E. refuga* and *E. hungarica* are dark brown or almost black, but yellow, ochreous or, at most, light brown in *E. perrara*. The new species also differs markedly in the distribution from its putatively closest relatives (based on paramere shape): Switzerland (*E. perrara*) versus Caucasus, Kazakhstan, Siberia and Mongolia (*E. armeniaca*, *E. congenita*, *E. matura* and *E. refuga*).

Discussion and conclusions

Hosts are known for only five of the 13 previously described *Eryngiofaga* species (Loginova 1977). Three species of the *mesomela* group develop on *Eryngium* species, and one species each of the *congenita* group and the *mesomela* group on *Bupleurum falcatum*. Li (2011) reported also *E. babugani* from this host based on a single male from China with reference to Loginova (1964). Judging from figure 867, Li's (2011) species is not *E. babugani* but resembles more *E. congenita*. Furthermore, Loginova (1964) treated under *E. babugani* a mix of *E. babugani* and *E. lautereri*. Loginova (1977) when revising the taxonomy, listed *B. falcatum* as host of the latter and wrote that the host of the former is unknown. The available data suggest that species of *Eryngiofaga* are monophagous. The host of *E. perrara* is unknown but the presence of *B. ranunculoides* at the type locality makes this plant a likely host.

Even though narrow geographic endemism is generally rare in psyllids (Burckhardt and Queiroz 2021), there are at least five species restricted to the Alps: *Craspedolepta carinthica* Ossiannilsson, 1963, *Cyamophila prohaskai* (Priesner, 1927), *Livilla vicina* (Löw, 1886), *L. vittipennella* (Reuter, 1875) and *Trioza remaudierei* Burckhardt & Lauterer, 2002. The biogeographic pattern of *E. perrara* is similar to that of *C. prohaskai* the only species known of the Alps of a genus very species rich in Central Asia.

It is unlikely, that *E. perrara* occurs only on Mount Pilatus, judging from the much wider distribution of the potential host plant. With only two specimens known, it is impossible to explain why *E. perrara* was so rarely collected and only at a single locality. More intensive and targeted fieldwork is needed to unravel the many questions surrounding this rare species.

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